

299-E25-19 (A4765) Log Data Report

Borehole Information:

Borehole: 299-E25-19 (A4765)		Site: 216-A-37-1 Crib			
Coordinates (WA State Plane)		GWL (ft)¹: 279.55	GWL Date: 3/07/2003		
North	East	Drill Date	TOC² Elevation	Total Depth (ft)	Type
135,659.03 m	575,952.33 m	Sept. 1976	207.498 m	287	Cable Tool

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded steel	0	unknown	10	unknown		20.95
Welded steel	0	unknown	8	unknown		151.95
Welded steel	1.95	6 5/8	6	0.3125	+1.95	301.95

The logging engineer measured the 6-in. casing stick up using a steel tape. A caliper was used to determine the outside casing diameter. The caliper and inside casing diameter were measured using a steel tape. Measurements were rounded to the nearest 1/16 in. The 6-in. casing thickness was calculated. There was no evidence of 10-in. and 8-in. casing at the ground surface as reported in Ledgerwood (1993). Surrounding the borehole stick-up is a round 18-in. by 4-in. high surface seal of grout.

Borehole Notes:

Borehole coordinates, elevation, and well construction information are from measurements by Stoller field personnel, HWIS³, and Ledgerwood (1993). Zero reference is the top of the 6-in. casing. A reference point survey "X" is located at the top of the casing stickup.

Logging Equipment Information:

Logging System:	Gamma 3E (RLS-1)	Type:	70% HPGe
Calibration Date:	10/2002	Calibration Reference:	GJO-2002-386-TAC
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3/Repeat	4	5
Date	3/06/03	3/07/03	3/10/03	3/10/03	3/10/03
Logging Engineer	Spatz	Spatz	Spatz	Spatz	Spatz
Start Depth (ft)	108.0	285.0	193.0	166.0	152.0
Finish Depth (ft)	2.0	165.0	165.0	148.0	107.0
Count Time (sec)	150	100	100	100	150
Live/Real	R	R	R	R	R
Shield (Y/N)	N	N	N	N	N
MSA Interval (ft)	1.0	1.0	1.0	1.0	1.0
ft/min	N/A ⁴	N/A	N/A	N/A	N/A
Pre-Verification	CE201CAB	CE211CAB	CE221CAB	CE221CAB	CE221CAB

Log Run	1	2	3/Repeat	4	5
Start File	CE201000	CE211000	CE221000	CE221027	CE221046
Finish File	CE201106	CE211120	CE221028	CE221045	CE221091
Post-Verification	CE201CAA	CE211CAA	CE221CAA	CE221CAA	CE221CAA
Depth Return Error (in.)	0	0	N/A	N/A	0
Comments	No fine-gain adjustment.	Fine-gain adjustment before logging.	Fine-gain adjustment before logging and after file 025.	No fine-gain adjustment.	Fine-gain adjustment after files 061 and 087.

Logging Operation Notes:

Zero reference was top of the 6-in. casing. Logging was performed without the centralizer on the sonde. The count time of 150 sec was used in the double-cased portion of the borehole. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT (^{40}K , ^{238}U , and ^{232}Th) verifier with serial number 118. During SGLS logging, fine-gain adjustments were needed to maintain the 1460-keV (^{40}K) photopeak at a pre-described channel.

Analysis Notes:

Analyst:	Sobczyk	Date:	03/17/03	Reference:	GJO-HGLP 1.6.3, Rev. 0
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SGLS pre-run and post-run verification spectra were collected at the beginning and end of each day and compared to control limits established on 12/05/2002. The verification spectra were all within the control limits except for spectra CE211CAB, CE221CAB, and CE221CAA. Pre-run verification spectra CE211CAB and CE221CAB were slightly above the value for the 1461-keV peak counts per second (cps). Post-run verification spectrum CE221CAA was above the upper control limit for the 609-keV full-width at half-maximum value. The peak counts per second at the 609-keV, 1461-keV, and 2615-keV photopeaks on the post-run verification spectra as compared to the pre-run verification spectra for each day were between 6 percent lower and 4 percent higher at the end of the day. Examinations of spectra indicate that the detector functioned normally during all of the logging runs, and the spectra are accepted.

Log spectra for the SGLS were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Post-run verification spectra were used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR. Concentrations were calculated in EXCEL (source file: G3Eoct02.xls), using parameters determined from analysis of recent calibration data. Zero reference was the top of the 6-in. casing. On the basis of information reported in Ledgerwood (1993), the casing configuration was assumed to be one string of 6-in. casing to total depth (301.9 ft), one string of 8-in. casing to 152 ft, and one string of 10-in. casing to 22 ft. Casing correction factors were calculated assuming a total casing thickness of 1.0 in. from 0 to 22 ft, 0.635 in. from 22 to 152 ft, and 0.3125 in. from 152 to 285 ft. The casing correction factor was calculated assuming a 6-in. casing thickness of 0.3125 in., an 8-in. casing thickness of 0.322 in., and a 10-in. casing thickness of 0.365 in. The 6-in. casing thickness is based upon the field measurement, and the 8-in. casing thickness of 0.322 in. and the 10-in. casing thickness of 0.365 in. are the published values for ASTM schedule-40 steel pipe (commonly used casing material at Hanford). Where more than one casing exists at a depth, the casing correction is additive (e.g., $0.322 + 0.3125 = 0.635$ would be the combined thickness for the 6-in. and 8-in. casings). A water correction was applied to the data below 279.55 ft. Dead time corrections were not applied because dead time was not greater than 18 percent.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K , ^{238}U , and ^{232}Th), and man-made radionuclides. Plots of the repeat logs versus the original logs are included. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation. The ^{214}Bi peak at 1764 keV was used to determine the naturally occurring ^{238}U concentrations on the combination plot rather than the ^{214}Bi peak at 609 keV because it is less affected by the presence of radon gas inside the casing.

Results and Interpretations:

^{137}Cs was the only man-made radionuclide detected in this borehole. ^{137}Cs was detected at log depths of 35, 95, 191, and 274 ft with concentrations near the MDL (0.2 pCi/g). After examination of the spectra, it was determined that there is no evidence of a photopeak at 662 keV. The reported peaks are probably the result of statistical fluctuation.

Recognizable changes in the KUT logs occurred in this borehole. However, the changes above 152 ft are more indicative of the well completion materials than the surrounding formation. The annulus between the 6-in. and 8-in. casings was perforated between 22 and 152 ft and grouted with bentonite and cement. The ^{40}K log shows significant changes at 222 and 274 ft. The 4-pCi/g decrease in ^{40}K concentrations at 222 ft corresponds with a transition from sand to coarser grained sediments as reported in Ledgerwood (1993).

The plots of the repeat logs demonstrate reasonable repeatability of the SGLS data for the natural radionuclides (609, 1461, 1764, and 2614 keV). ^{238}U (609 keV) concentrations based on the repeat log run are about 0.25 pCi/g lower than those based on the original log run. Similarly, ^{238}U (1764 keV) concentrations based on the repeat log run appear slightly lower than those based on the original log run. This behavior suggests that radon may be present inside the borehole casing. The effects of radon on borehole logging is described in GJO-HGLP 1.6.3, Rev. 0 (2003).

The presence of radon is not an indication of man-made contamination: it is derived from decay of naturally occurring uranium. As a gas, radon moves easily in the subsurface, and concentrations of radon and its associated progeny can change quickly.

The gross gamma log from Additon et al. (1977) (attached) indicates that the sediments surrounding this borehole contained only background amounts of gamma radiation in 1976.

References:

Additon, M.K., K.R. Fecht, T.L. Jones, and G.V. Last, 1978. *Scintillation Probe Profiles From 200 East Area Crib Monitoring Wells*, RHO-LD-28, Rockwell Hanford Operations, Richland, Washington.

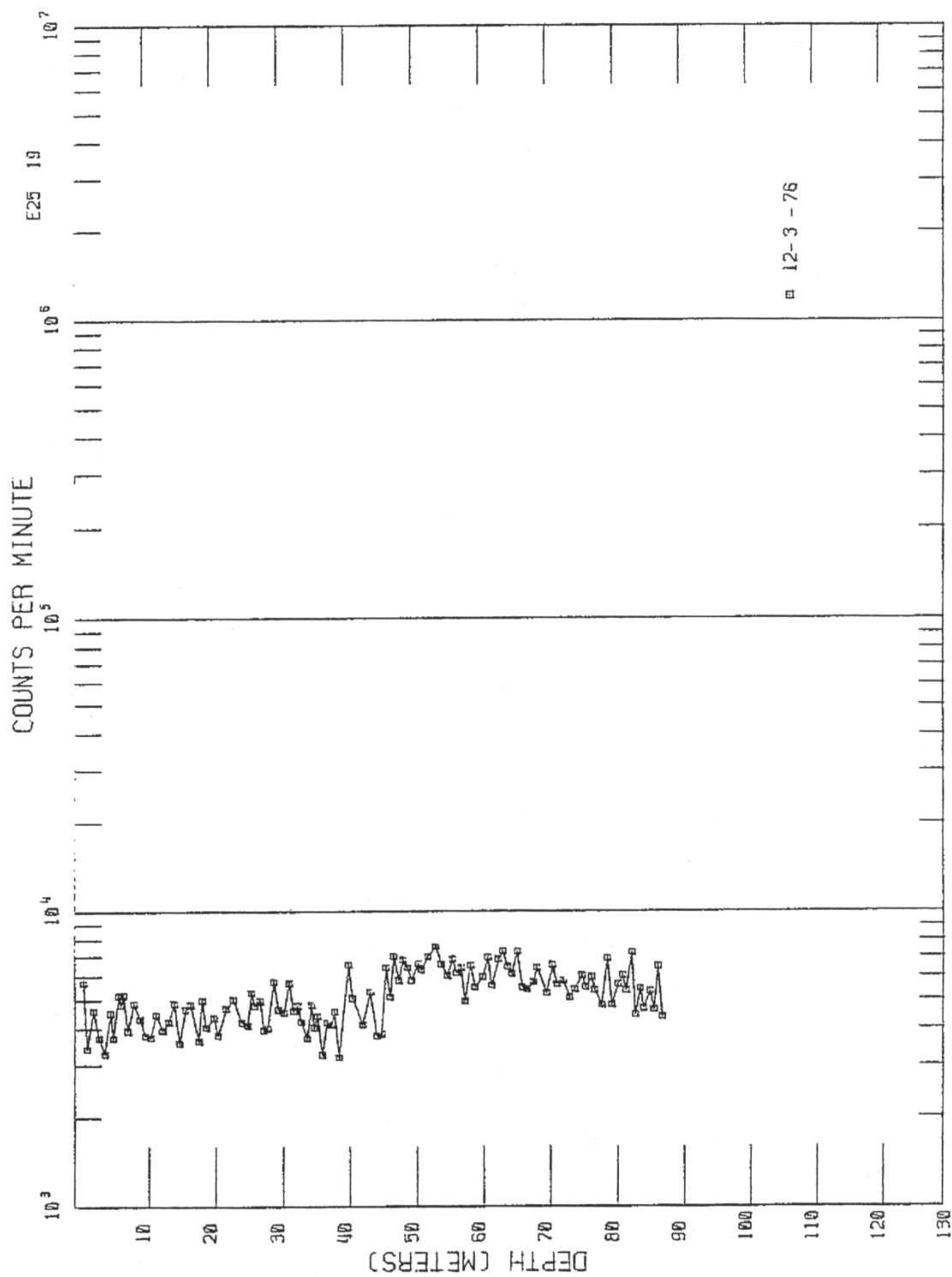
Ledgerwood, R.K., 1993. *Summaries of Well Construction Data and Field Observations for Existing 200-East Resource Protection Wells*, WHC-SD-ER-TI-007, Rev 0, Westinghouse Hanford Company, Richland, Washington.

¹ GWL – groundwater level

² TOC – top of casing

³ HWIS – Hanford Well Information System

⁴ N/A – not applicable

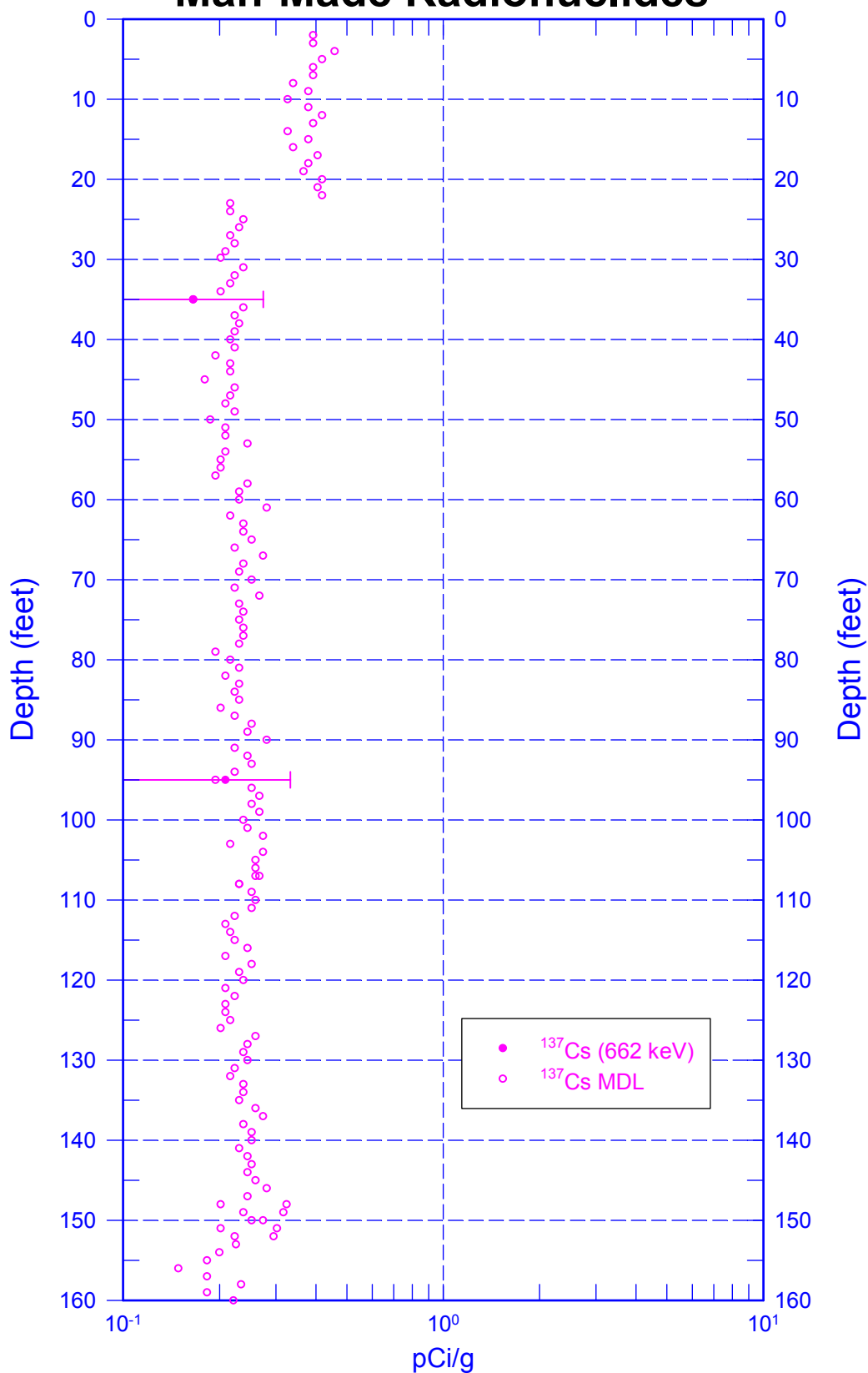


from Additon et al. (1978)

Scintillation Probe Profile for Borehole 299-E25-19, Logged on 12/3/76

299-E25-19 (A4765)

Man-Made Radionuclides

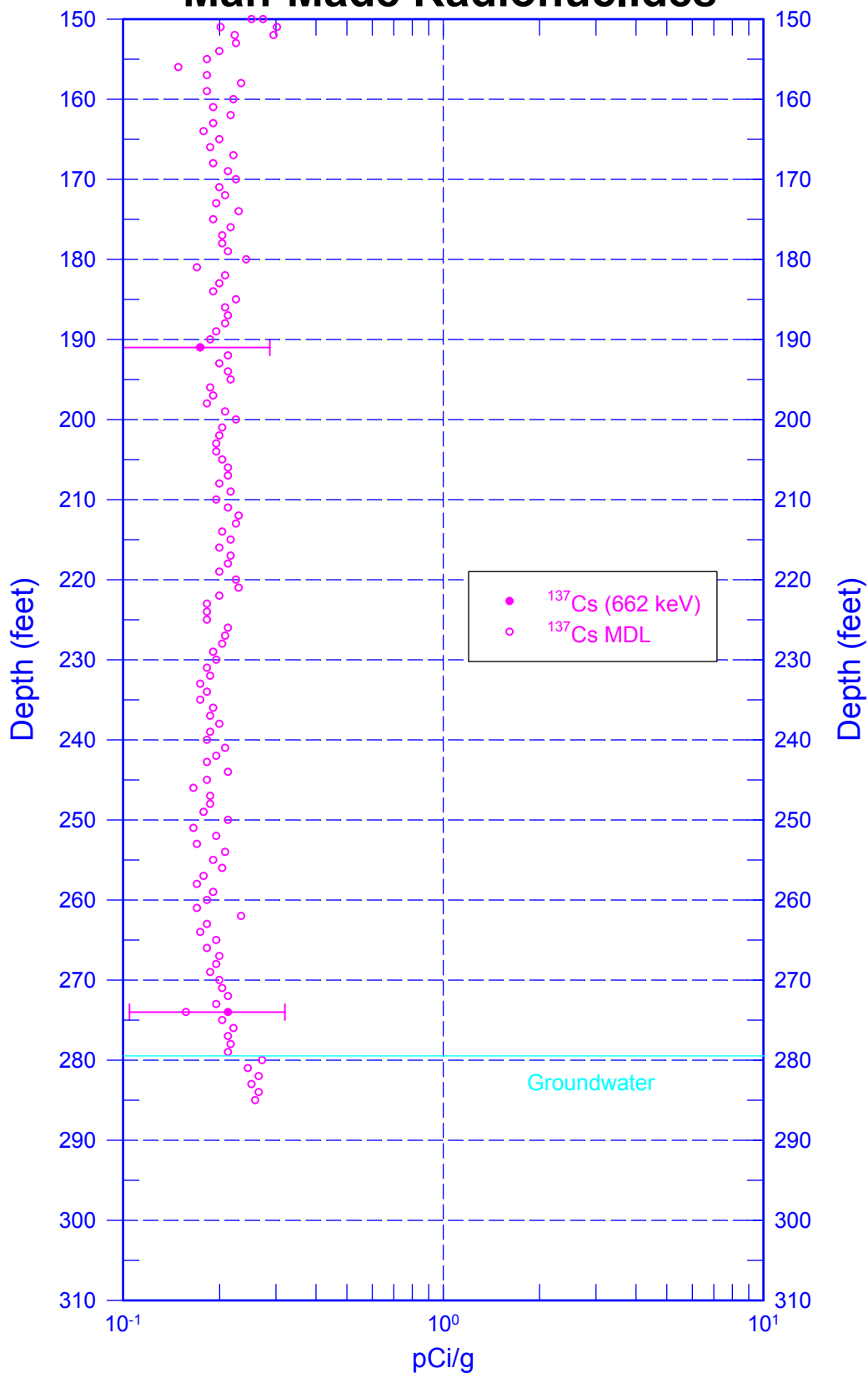


Zero Reference = Top of Casing

Date of Last Logging Run
3/10/2003

299-E25-19 (A4765)

Man-Made Radionuclides

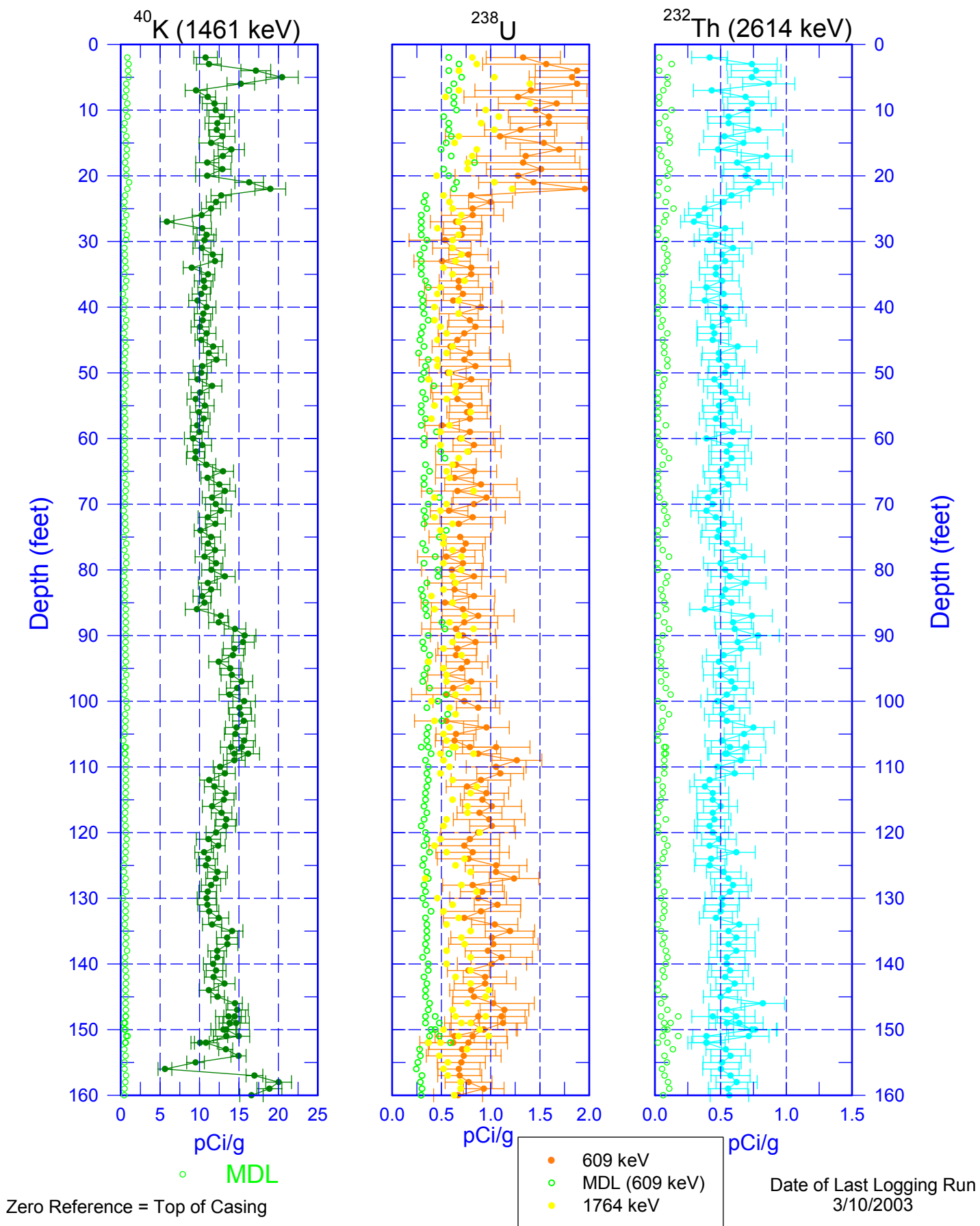


Zero Reference = Top of Casing

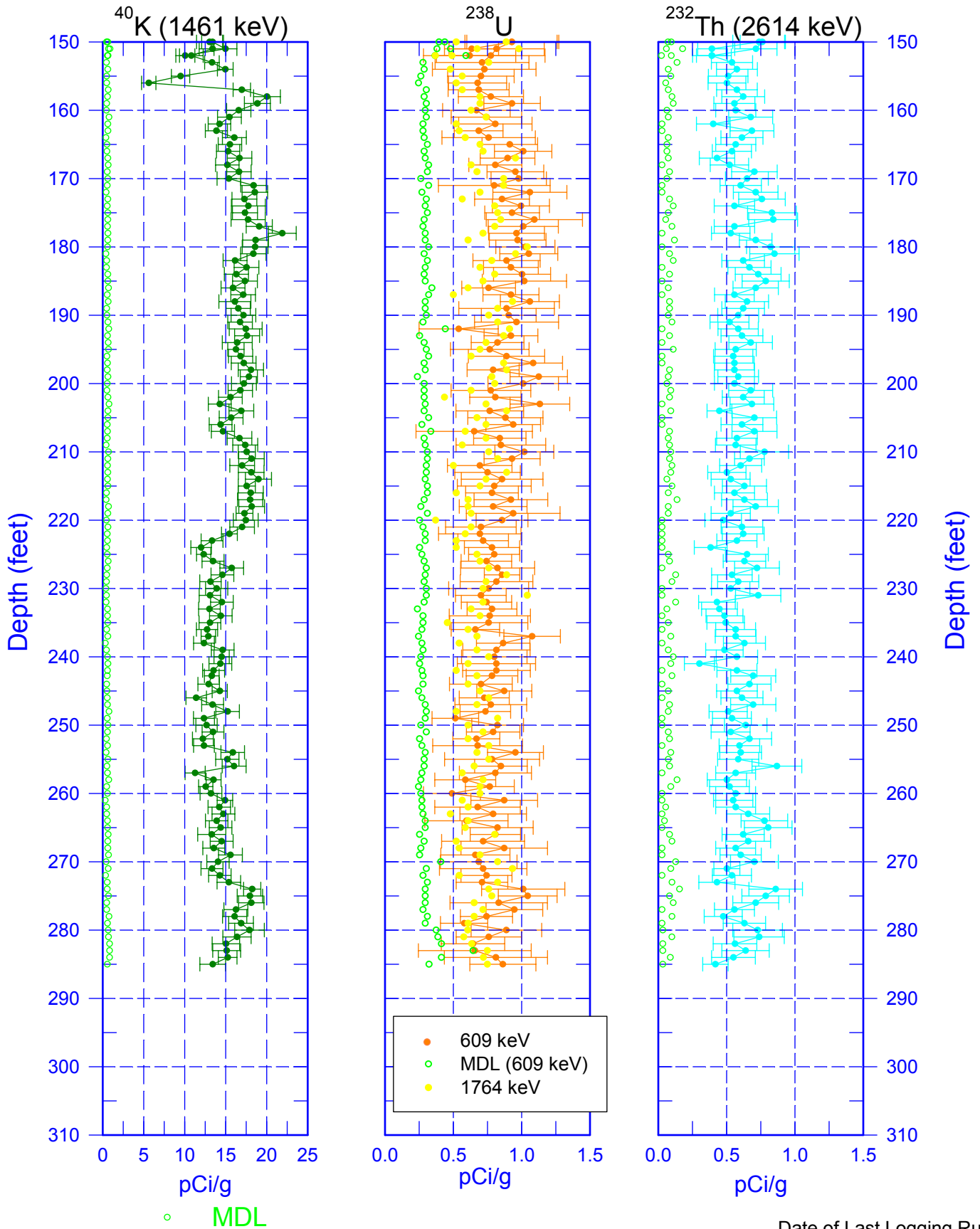
Date of Last Logging Run
3/10/2003

299-E25-19 (A4765)

Natural Gamma Logs



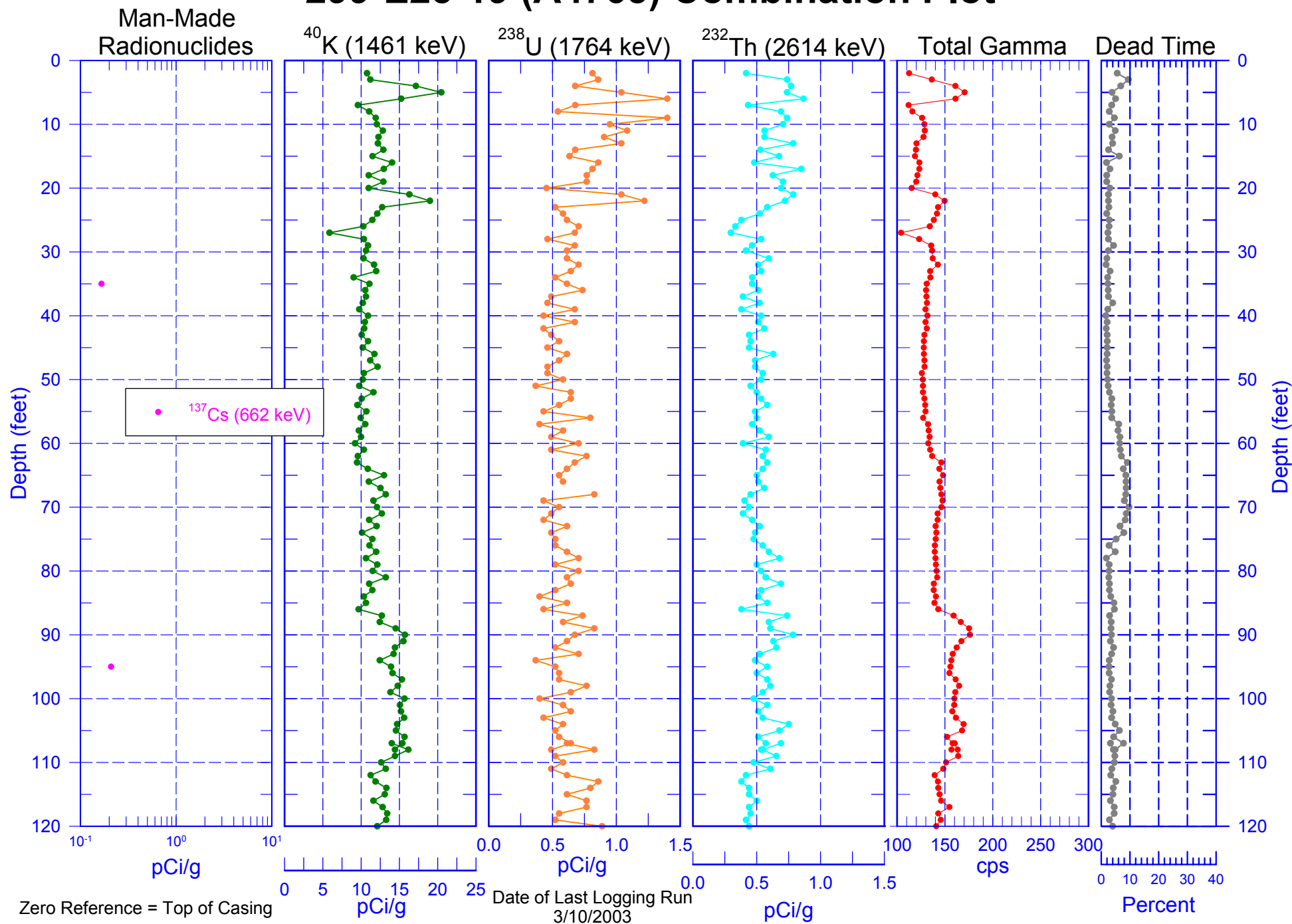
299-E25-19 (A4765) Natural Gamma Logs



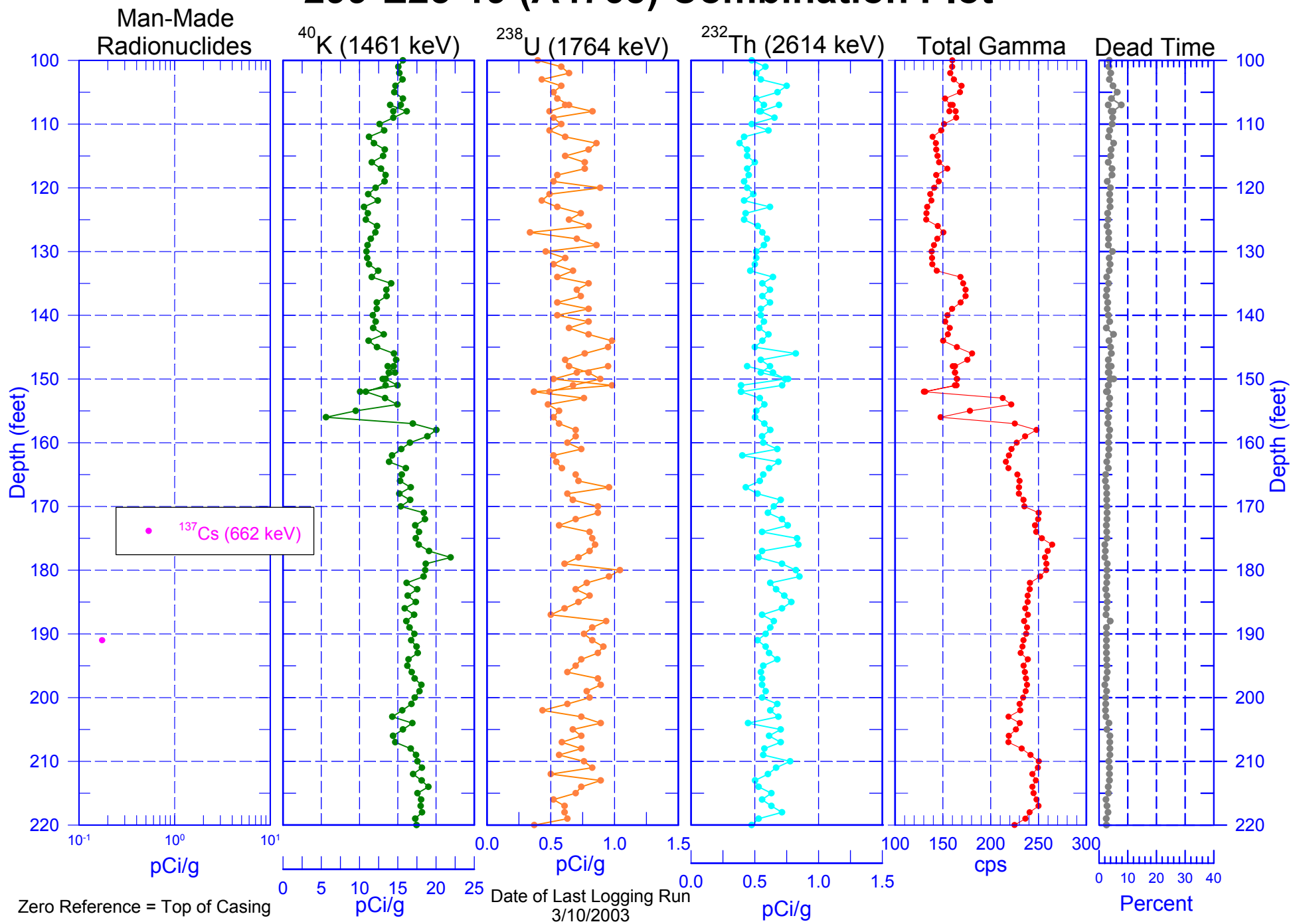
Zero Reference = Top of Casing

Date of Last Logging Run
3/10/2003

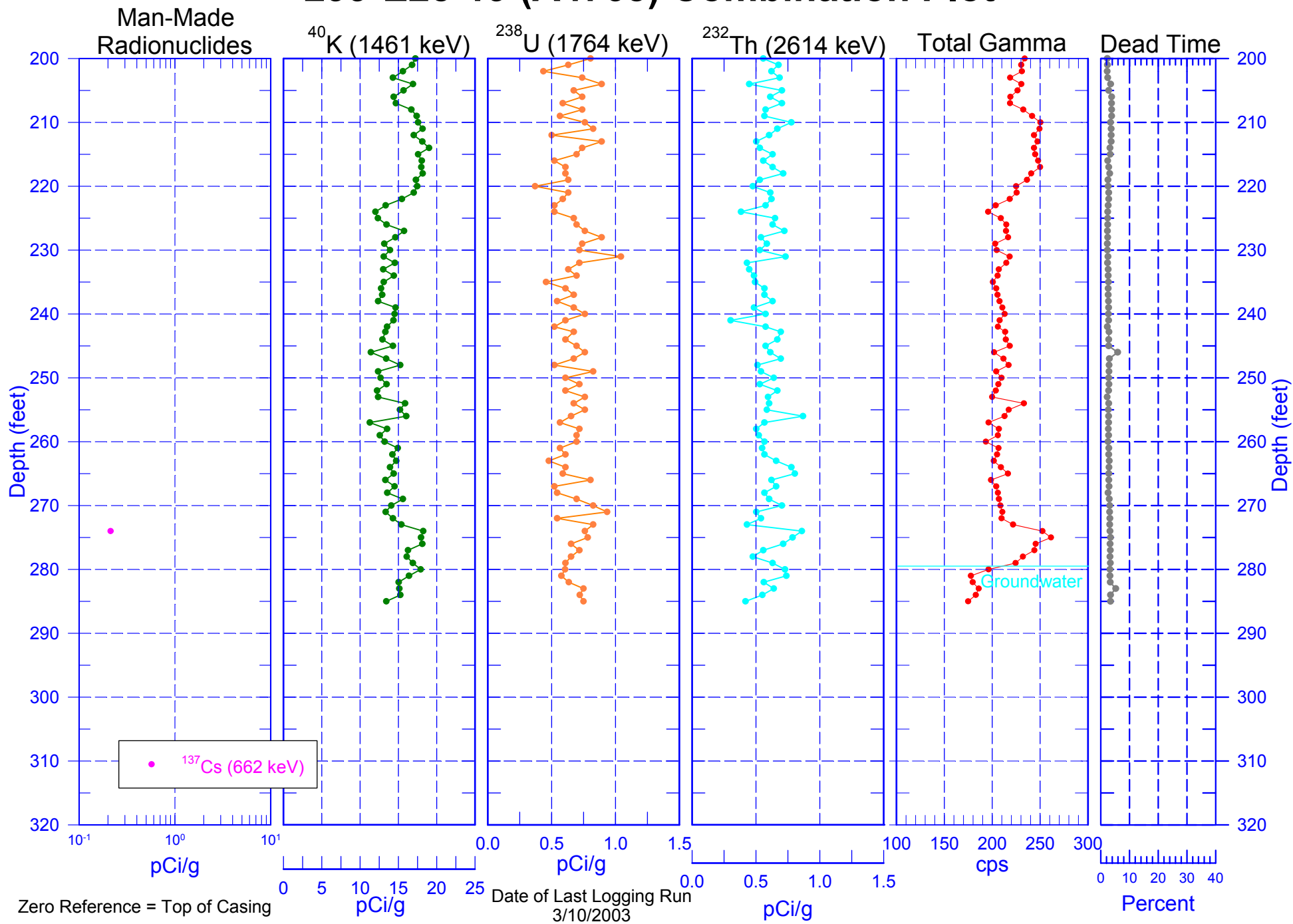
299-E25-19 (A4765) Combination Plot



299-E25-19 (A4765) Combination Plot

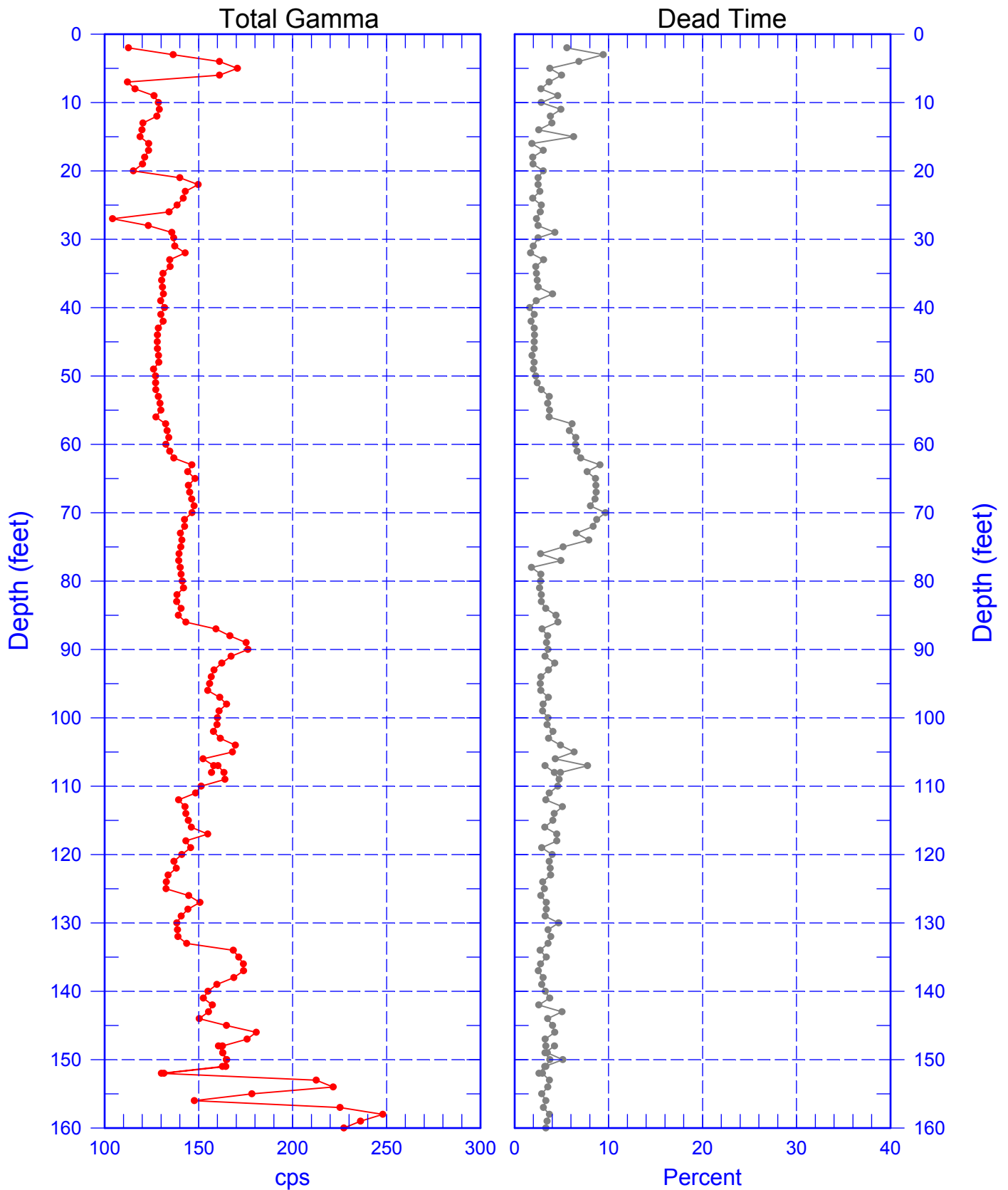


299-E25-19 (A4765) Combination Plot



299-E25-19 (A4765)

Total Gamma & Dead Time

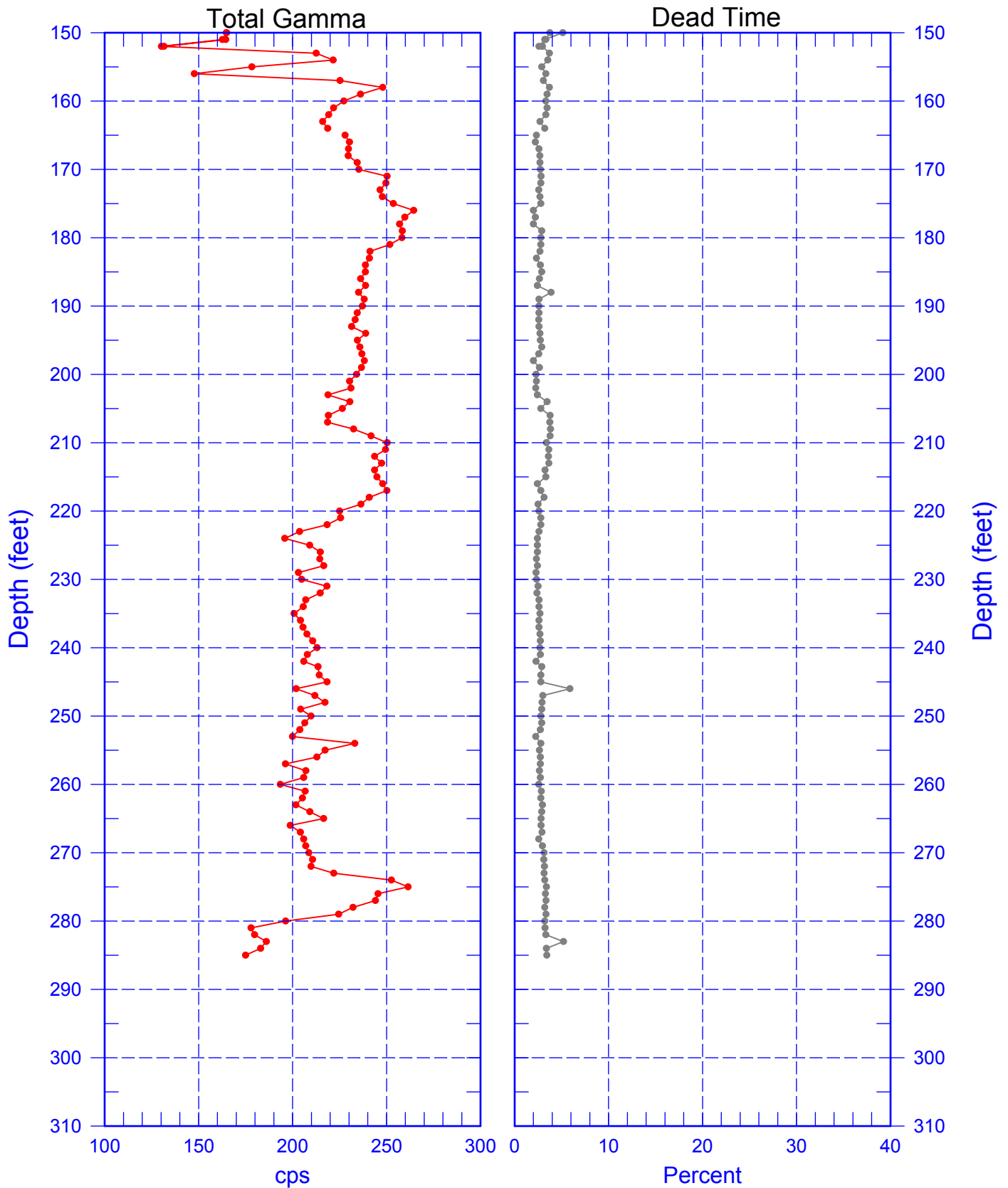


Zero Reference = Top of Casing

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299-E25-19 (A4765)

Total Gamma & Dead Time



Zero Reference = Top of Casing

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299-E25-19 (A4765)

Rerun of Natural Gamma Logs (193.0 to 165.0 ft)

